WE CLAIM:

1. A device for exposing a substrate surface to one or more fluids, the device comprising:

a substrate having a surface containing a contiguous target region;

a cover plate having a surface capable of fluid-tight contact with the substrate surface;

a plurality of fluid-transporting features present in the cover plate surface, the fluid-transporting features separated by at least one partitioning wall representing an integral portion of the cover plate;

a plurality of inlets, wherein each inlet is in fluid communication with a fluid-transporting feature;

at least one outlet associated with the plurality of fluid-transporting features; and

a positioning means for positioning the cover plate surface in fluid-tight contact with the substrate surface such that the at least one partitioning wall contacts a location on the contiguous target region,

wherein each fluid-transporting feature, in combination with the substrate surface, forms a flow passage containing a distinct exposure zone on the target region such that each distinct exposure zone is downstream from the inlet in fluid communication therewith and upstream from the at least one outlet.

2. The device of claim 1, wherein the substrate is detachable from the cover plate.

3. The device of claim 1, wherein the substrate surface is substantially planar.

4. The device of claim 1, wherein the fluid-transporting features are channels.

5. The device of claim 4, wherein the features comprise eight channels.

6. The device of claim 4, wherein the channels are substantially parallel to each other.

7. The device of claim 6, wherein each channel defines a flow direction from an upstream terminus towards a downstream terminus and the flow directions of the channels are the same.

8. The device of claim 7, comprising a single outlet in fluid communication with all of the channels.

9. The device of claim 4, wherein the channels are the same size.

10. The device of claim 9, wherein the channels each have a width of about 0.1 to about 500 micrometers.

11. The device of claim 10, wherein the channels each have a width of about 200 to about 400 micrometers.

12. The device of claim 1, wherein each distinct exposure zone contains a cell.

13. The device of claim 12, wherein each distinct exposure zone contains a different type of cell.

14. The device of claim 12, wherein each distinct exposure zone contains a plurality of cells.

15. The device of claim 14, wherein each distinct exposure zone contains a plurality of different cells.

16. The device of claim 12, wherein the entire target region is covered with a plurality of cells.

17. The device of claim 16, wherein the plurality of cells forms a cellular monolayer.

18. The device of claim 12, wherein each distinct exposure zone further contains a cell-adhering substance.

19. The device of claim 12, wherein an array of cellular features is present on the target region.

20. The device of claim 19, wherein at least a portion of a cellular feature is interposed between the target region and the at least one partitioning wall.

21. The device of claim 1, wherein each inlet is in fluid communication with a source of fluid.

22. The device of claim 21, wherein each inlet is in fluid communication with a different source of fluid.

23. The device of claim 21, wherein each inlet is in fluid communication with the same source of fluid.

24. The device of claim 21, wherein at least one source of fluid contains a suspension of cells.

25. The device of claim 24, wherein the suspension contains cells of different types.

26. The device of claim 24, wherein the suspension contains cells of the same type.

27. The device of claim 21, wherein at least one source of fluid contains a body fluid.

28. The device of claim 21, wherein at least one source of fluid contains a candidate compound for interaction with a cell.

29. The device of claim 1, wherein the positioning means allows for the repositioning of the at least one partitioning wall to contact the contiguous target region at a different location.

30. The device of claim 29, wherein the positioning means allows for the rotational reorientation of the cover plate and the substrate surfaces.

31. A method for exposing a substrate surface to a plurality of cells, comprising:

(a) providing a substrate having a surface containing a contiguous target region; and

(b) maintaining a plurality of fluids each in contiguous laminar flow over the target region, wherein each fluid conveys a cell over a distinct exposure zone on the target region, thereby exposing the distinct exposure zone to the cell.

32. The method of claim 31, wherein the distinct exposure zones are defined at least in part by at least one partitioning wall contacting the contiguous target region.

33. The method of claim 31, wherein the distinct exposure zones are elongated.

34. The method of claim 31, wherein the distinct exposure zones are substantially parallel to each other.

35. The method of claim 34, wherein a fluid flows over each distinct exposure zone in the same direction.

36. The method of claim 34, wherein the distinct exposure zones are the same size.

37. The method of claim 31, wherein each fluid conveys a plurality of cells.

38. The method of claim 37, wherein the cells in each fluid are conveyed in a single file manner over a distinct exposure zone.

39. The method of claim 31, further comprising, after step (a) and before step (b), (a') immobilizing a cell in each distinct exposure zone.

40. The method of claim 39, wherein each distinct exposure zone contains a different type of immobilized cell.

41. The method of claim 39, wherein the entire target region is covered with a plurality of cells.

42. The method of claim 41, wherein the plurality of cells forms a cellular monolayer.

43. The method of claim 39, wherein step (a') comprises immobilizing the cells to form an array of cellular features on the target region.

44. The method of claim 43, wherein each of the cellular features is located in an exposure zone.

45. The method of claim 43, wherein each of the cellular features is located in a plurality of exposure zones.

46. The method of any of claims 39-45, further comprising during or after step (b), (c) detecting a cell-cell interaction in any of the distinct exposure zones, if present, as a result of the contact or proximity between a cell conveyed by a fluid and an immobilized cell.

47. A method for detecting cell-cell interactions comprising:

(a) providing a substrate having a surface containing a contiguous target region;

(b) immobilizing a plurality of cells in the contiguous target region;

(c) placing at least one partitioning wall in contact with the contiguous target region, thereby defining a plurality of distinct exposure zones on the target region;

(d) maintaining a plurality of fluids each in contiguous laminar flow over the target region, wherein each fluid conveys a cell over a distinct exposure zone, thereby exposing any immobilized cells in the distinct exposure zone to the cell conveyed by the fluid; and

(e) detecting a cell-cell interaction, if present, in any of the distinct exposure zones as a result of the contact or proximity between a cell conveyed by a fluid and an immobilized cell.

48. A method for exposing a substrate surface to a plurality of fluids, comprising:

(a) providing

a substrate having a surface containing a contiguous target region,

a cover plate having a surface capable of fluid-tight contact with the substrate surface,

a plurality of fluid-transporting features present in the cover plate surface, the fluid-transporting features separated by at least one partitioning wall representing an integral portion of the cover plate,

a plurality of inlets, wherein each inlet is in fluid communication with a fluid-transporting feature, and

at least one outlet associated with the plurality of fluid-transporting features,

(b) positioning the cover plate surface in fluid-tight contact with the substrate surface such that the at least one partitioning wall contacts the contiguous target region at a location and that each fluid-transporting feature, in combination with the substrate surface, forms a flow passage containing a distinct exposure zone on the target region such that each distinct exposure zone is downstream from the inlet in fluid communication therewith and upstream from the at least one outlet; and

(c) maintaining one or more fluids in laminar flow from one or more sources through the inlets over the target region such that the one or more fluids contact the exposure zones on the target region.

49. The method of claim 48, further comprising, after step (c), (d) maintaining at least one additional fluid in contiguous laminar flow over the target region, wherein the at least additional one fluid contacts at least one secondary exposure zones on the target region that is different from the distinct exposure zones formed in step (b), thereby exposing the at least one secondary exposure zones to the at least one additional fluid.

50. The method of claim 49, wherein step (d) comprises repositioning the cover plate surface in fluid-tight contact with the substrate surface such that the at least one partitioning wall contacts the contiguous target region at a different location and that the flow passages formed as a result of each fluid-transporting feature, in combination with the substrate surface contain a secondary distinct exposure zone on the target region.

51. The method of claim 50, wherein the cover plate surface is rotationally reoriented over the substrate surface.

52. The method of claim 51, wherein the cover plate surface is rotationally reoriented over the substrate surface by 60° to 120°.

53. The method of claim 52, wherein the cover plate surface is rotationally reoriented over the substrate surface by 90°.